

### REMARKS/ARGUMENTS

Claims 16-32 remain pending in the patent application. Claim 28 has been amended. Claims 1-15 were canceled without prejudice or disclaimer in a previously filed Preliminary Amendment.

#### **I. Claim Amendment**

Claim 28 has been amended to depend from independent claim 27. Due to a self-evident typographical error, claim 28 was listed as erroneously depending from itself (i.e., claim 28). Claim 28 is the only dependent claim associated with claim 27 and should, therefore, depend from this claim (i.e., claim 27). No new matter been added. The amendment has not been made for patentability reasons.

#### **II. Foreign Priority Claim**

The foreign priority claim to German priority documents 10037971.0 and 10037990.7, filed on August 3, 2000, has not been entered because it was believed not to have been filed within the time period set forth in 37 C.F.R. §1.55(a)(1). The priority claim to the correct applications was timely made, but was accompanied by inadvertent, immaterial error in the listed data. These dates (i.e., August 3, 2000 – 8/3/00) were apparently reversed in the Declaration, which inadvertently identified the filing date of the German priority documents as the earlier date of March 8, 2000 (i.e., 3/8/00). Applicants have enclosed certified copies of all German priority documents 10037971.0, 10037990.7, 10055169.6, and 10055168.8 from which priority is claimed, as required by 35 U.S.C. §119(b). As indicated on the front cover of documents 10037971.0 and 10037990.7, the filing date (i.e., Anmeldetag) of these documents is August 3, 2000. Applicants' foreign priority claim thus was indeed timely filed within 16 months of the foreign filing date, notwithstanding the clerical error based on a reversal of the priority date numerals and a typographical error in one of the application numbers.

Applicants therefore respectfully request that foreign priority claim to German patent documents 10037971.0 and 10037990.7 either be entered, or that it be held in abeyance while Applicants prepare and submit a corrected Declaration, rectifying the clerical errors in the original.

### **III. General Overview**

The present invention is generally directed to industrial controllers and systems and methods for their programming and use, involving, among other things, distributing "technology objects," which are sometimes interleaved to form more complex technology objects, over a plurality of devices that form an industrial controller or control system. These technology objects are software objects (as is made clear throughout the specification). Software objects are understood in the art, and the "technology objects" to which the invention relates are a specific kind of software object. As is described in the specification, the technology objects are capable of representing real world components, such as "components of machine tools or production machines." App. at para. 10. Some examples of technology objects represent, "axles, cams, cam plates and the like." App. at para. 35. Other examples are: time, virtual axis, leading axis, external sensor and synchronism. App. at para. 45. These technology objects can be clustered to form technology packages. App. at para. 54. This approach according to the present invention not only allows the "technological capability" of the controller to be readily understood by a user of the controller, but also permits their reuse, e.g., by instantiation from technology object types, and the expansion of the functional depth of a controller. App. at para. 10. Technology objects are independent of hardware- and platform-specific properties. App. at para. 17. Moreover, the separation of the technological functionality (i.e., of the technology objects representing real world components) are abstracted from the devices on which the objects runs, allowing flexible allocation and re-allocation of the technology objects among distributed controllers to optimize criteria such as utilization of capacity, spatial distribution and bus length. App. at para. 12. .

The technology objects can be loaded into the controller's run time system, where instances of these objects can be accessed from the run time system and used in an application program. The application program (using instances of the technology objects) can then be

loaded into an industrial controller for controlling an industrial process. This, in turn, provides technological scalability based on the additional loadability of different technology object types.

In sum, the technology objects according to an aspect of the present invention are distinct from “function blocks” not only as software constructs, but also in terms of what they are intended to model for purposes of industrial control. “Function block” is a term of art defined, for example, by the Process/Industrial Instruments and Controls Handbook, Fifth Edition, page 3.43, as:

Like SFC (Sequential Function Chart) (Fig. 11), Function Block is a graphical language that allows programming in other languages (Ladder, Instruction List, or Structured Text) to be nested with the function block. In Function Block, program elements appear as blocks that are “wired” together in a manner resembling a circuit diagram.

A copy of the relevant parts of this Handbook is provided with the accompanying Information Disclosure Statement. This definition of “function block” does not disclose or suggest software objects. That a function block is not an “object” as that term would be understood among software engineers is also made clear in the Handbook. Simply put, an “object” is not anticipated by a “function block.”

The cited references do not address software objects, much less the technology objects or their distribution or interleaving according to the aspects of the present invention. The function blocks they refer to do not have the properties of software objects, nor of technology objects, and do not, moreover, represent real world components such as the axles, cams, cam plates, and the other components, but are limited to functioning as process algorithms for the purposes of manipulating data and/or control signals within the controller or for other control components.

#### **IV. Rejection Under 35 U.S.C. § 102(b)**

Claims 16-19, 21-23, and 25-32 were rejected as being anticipated by U.S. 5,841,654 to Verissimo et al. (hereinafter Verissimo). Applicants respectfully submit that these rejections are traversed on the basis of the following arguments.

##### **i. Claims 16**

Claim 16 is directed to an industrial controller having a plurality of devices for controlling a plurality of components. The industrial controller comprises a control means independent of the components that are to be controlled by the industrial controller and a plurality of technology objects that correspond to the components that are to be controlled.

Verissimo does not disclose or suggest all of the limitations of claim 16, particularly when those terms are properly understood in the field of industrial control, as discussed above in Section III. The pending rejection does not meet the burden of showing that each element of the claimed invention is identically shown by the cited reference.

In particular, the rejection is based on the misapprehension that that a “function block,” as in the cited reference, discloses a “technology object.” No reasoning is provided to support this incorrect view. As discussed above, and as the Process/Industrial Instruments and Controls Handbook makes clear,<sup>1</sup> a function block does not disclose or suggest a software object.

The claimed invention, moreover, recites not merely “objects,” but “technology objects.” Verissimo not only fails to disclose software objects, but does not in any way describe or suggest objects, much less, distributable technology objects, as recited in claim 16 and as described above in Section III. “Technology objects” capture the functionality of industrial control in a manner that is not even contemplated by Verissimo.

The Office Action further recites column 6, line 65, to column 7, line 22, of Verissimo as allegedly including technology objects distributable on the devices. Verissimo merely mentions field mounted devices that are limited to three functional blocks. As discussed above, Verissimo does not in any way describe or suggest technology objects. Moreover, Applicants refer to Figure 3 of applicants’ specification, which illustrates an example of a technology object. There is nothing in Verissimo that remotely resembles or compares to the illustrated technology object.

Since Verissimo does not disclose or suggest all of the limitations of claim 16, that claim is submitted to recite patentable subject matter.

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<sup>1</sup> A function block similar to that shown in Figs. 6O and 6P of Verissimo are shown in Fig. 11 of the Handbook.

**ii. Claim 17**

Claim 17 directly depends from allowable claim 16 and is, therefore, submitted to be allowable for the same reasons. Moreover, claim 17 is directed to automatically generated communication between two or more technology objects. Verissimo does not describe or suggest technology objects, much less, technology objects having automatically generated communications between the technology objects. As a result, column 7, lines 64-67 of Verissimo purporting to providing serial communications between a computer and other devices does not disclose communication between technology objects. Claim 17 is therefore submitted to be separately patentable for this reason.

**iii. Claim 18**

Claim 18 directly depends from allowable claim 16 and is submitted to be allowable for the same reasons. Claim 18 is directed to technology objects that comprise attributes that are taken into consideration in the generation of communication links. Verissimo does not describe or suggest a technology object, nor, therefore, technology objects that comprise such attributes. Furthermore, column 7, lines 24-28 of Verissimo relied on as showing linking of various function blocks based on a user's control strategy, does not disclose generation of "communication links," as recited. Linking of function blocks does not disclose or suggest technology objects comprising attributes involved in generating communication links. See Application at para. 28. Claim 18 is therefore submitted to be separately patentable over the art of record.

**iv. Claim 19**

Claim 19 directly dependent from allowable claim 16, is submitted to be allowable for the same reasons. Claim 19 recites that the technology objects are distributable on a plurality of devices within a project, the project relating to a plurality of control units. Verissimo fails to describe or suggest a technology object, much less, distributing technology objects on a plurality of devices within a project relating to a plurality of control units. As recited in the Office Action,

column 9, lines 15-59 of Verissimo allegedly describes a flow diagram that relates to the use of the computer for sending commands to the field mounted devices, based on the user's selection of available options (e.g., download command, select existing configuration file, etc.).

Verissimo allegedly describes the distribution of commands to field mountable devices, and does not describe or suggest the distribution of technology objects. Technology objects are not merely distributed commands, but are software objects having technological functionality, as described at length above. Claim 19 is submitted to be allowable on this additional basis.

**v. Claim 21**

Claim 21 also directly depends from allowable claim 16 and is submitted to be allowable on the same grounds. Claim 21 is directed to the technological scaling of the functionality of a controller that is permitted through the use of technology object types. Verissimo neither describes nor suggests a technology object, much less permits the technological scaling of a controller using technology objects, as required. Column 5, line 65, to column 6, line 11 of Verissimo relied on in support of the rejection confirms this, as it completely fails to describe or suggest the use of technology objects and purports to describe mere downloading of programming information to the field mounted devices. There is no description or suggestion of technology objects, much less, technology objects that provide technological scaling for the functionality of the controller, as recited in claim 21. Therefore, claim 21, is submitted to be directed to patentable subject matter on this separate basis.

**vi. Claim 22**

Claim 22 directly depends from allowable claim 16 and is submitted to be allowable for the same reasons. Moreover, claim 22 is directed to interleaving the technology objects to form container objects. The Office Action relies on column 11, lines 62-66 of Verissimo as allegedly describing the claimed interleaved technology objects. But, as amply discussed above, Verissimo fails to describe or suggest any technology object, much less technology objects that are interleaved to form container objects. The language relied on in support of the rejection purportedly describes saving a completed configuration file, which is completely unrelated to technology objects, much less interleaving them. For this reason, claim 22 is directed to patentable subject matter, and is, therefore, allowable.

**vii. Claim 23**

Claim 23 directly depends from claim 16 and is submitted to be allowable on the same grounds. Claim 23 is directed to providing the user with a plurality of views of the technology objects. The Office Action recites column 11, lines 45-55 of Verissimo as allegedly providing a view of the technology objects to a user. Verissimo purportedly describes displaying a list of function blocks in a window and not technology objects. As established, Verissimo's function blocks are completely technologically unrelated to applicants' technology objects. Therefore, since Verissimo does not describe or suggest a technology object, it is not surprising that Verissimo cannot provide a plurality of views of technology objects to a user. Claim 23 is thus allowable.

**viii. Claim 25**

Claim 25 directly depends from claim 16 and is therefore allowable for the same reasons. Moreover, claim 25 is directed to representing technology objects in graphical form in the engineering system. Verissimo fails to describe or suggest a technology object, much less, the representation of technology objects in graphical form. Claim 25 is for this separate reason submitted to be directed to patentable subject matter.

**iv. Claim 26**

Claim 26 directly depends from claim 16 and is submitted to be allowable for the same reasons. Claim 26, moreover, is directed to technology object types being clustered into technology object packages. An embodiment of this aspect of the present invention is shown and described at Figure 10 of the application and the accompanying text. As the Verissimo reference fails to describe or suggest a technology object, it necessarily fails to describe or suggest technology object types that are clustered into technology packages. Column 7, lines 24-32 of Verissimo allegedly refers to building control strategies by linking function blocks. Not only does this fail to disclose or suggest technology objects, but it also does not disclose or suggest clustering into a package any software structures, much less technology objects. Claim 26 is therefore submitted on this separate basis to be directed to patentable subject matter.

**x. Claim 27**

Claim 27 is directed to a method of programming an industrial control system by interleaving technology objects in order to form a set of complex technology objects, whereby the set of complex technology objects are then distributed on a plurality of devices. The method also comprises reusing at least one of the complex technology objects in a second project.

As discussed above at length, Verissimo does not describe or suggest a technology object, much less, programming an industrial control system using technology objects that have been interleaved.

As relied on in the Office Action, column 13, lines 11-25 of Verissimo allegedly describes a user programming process on a computer including the selection of several function blocks from several field-mounted devices that have been selected by the user in a configuration window of a computer. This does not disclose, literally or by implication, any “interleaving” of technology objects to form a set of complex technology objects. Interleaving, as described in the specification, “takes place through hierarchical relationships between the technology objects and/or data flow relationships.” Application at para. 0021. There has been absolutely no showing that “linking” identically discloses or suggests “interleaving” to form a more complex structure or any hierarchical relationships between the technology objects.

Column 9, lines 15-59 of Verissimo allegedly describes a flow diagram that relates to the use of the computer for sending commands to the field mounted devices, based on the user’s selection of available options (e.g., download command, select existing configuration file, etc.). While Verissimo allegedly describes the distribution of commands to field mountable devices, the passage relied upon in support of the rejection neither describes nor suggests distributing a plurality of technology objects on a plurality of devices.

The rejection further relies on column 9, lines 24-28 of Verissimo as supposedly describing the selection of an existing link file for downloading commands to the field mounted devices. As with all other recited passages of Verissimo, technology objects are neither described nor suggested. Even assuming without conceding that it did, Verissimo fails to disclose or suggest “reusing at least one of the complex [i.e., interleaved] technology objects” or doing so in connection with a “second project,” as recited.

For these reasons, claim 27 is submitted to be allowable over the art of record.

**xi. Claim 28**

Claim 28 depends directly from claim 27 and is submitted to be allowable for the same reasons. Moreover, claim 28, which recites language analogous to that of claim 18, is also submitted to be allowable based on the arguments set forth in relation to that claim 18, above.

**xii. Claim 29**

Claim 29 is directed to a method of programming an industrial control system by interleaving instantiated technology objects in order to form a set of complex technology objects, whereby the set of complex technology objects are then distributed on a plurality of devices. The method also comprises generating communication channels between the technology objects and reusing at least one of the complex technology objects formed by the interleaving of the instantiated technology objects in a second project.

Based on the arguments discussed in support of claim 27, as recited in the Office Action, column 13, lines 11-25; column 9, lines 15-59; and column 9, lines 24-28 of Verissimo fail to describe or suggest technology objects, much less, instantiating, distributing, or generating communications between such technology objects, as recited in claim 29.

Moreover, column 7, lines 64-67 of Verissimo, allegedly describes data communications between the control computer and other devices. This passage from Verissimo relied on in support of the rejection fails to disclose or suggest using technology objects, much less, generating communication channels between the technology objects of a first project, as recited.

Still further, column 9, lines 24-28 of Verissimo relied on in support of the rejection allegedly describes instantiating the technology objects. As amply discussed above, Verissimo describes nothing of the sort, but mere downloading of a link file to field mounted devices.

In sum, and as described at length above, none of the instantiation, interleaving, distributing, generation of communication channels or reuse steps, are disclosed or suggest, whether with or without the involvement of technology objects. Claim 29 therefore is submitted to recite patentable subject matter.

**xiii. Claim 30**

Claim 30 is also directed to a method of programming an industrial control system. The method includes selecting a plurality of technology objects relevant to a desired application, interleaving the selected technology objects to form technology objects having complex functionality and distributing the interleaved technology objects onto a device.

As discussed above, for example in traversing the rejections of claims 27 and 29, column 13, lines 11-25, and column 9, lines 15-59 of Verissimo fail to describe or suggest technology objects, much less, interleaving to form complex technology objects or distributing these complex technology objects.

The rejection relies on column 11, lines 45-50, as recited in the Office Action, as allegedly describing the selection of a plurality of technology objects relevant to a desired application. This recited passage fails to describe or suggest technology objects, much less, selecting a plurality of technology objects relevant to a desired application, interleaving them to form technology objects having complex functionality or distributing the interleaved technology objects.

Claim 30 is therefore submitted to be directed to allowable subject matter.

**xiv. Claim 31**

Claim 31 depends directly from claim 30 and is therefore submitted to be allowable on the same grounds. Moreover, claim 31 is directed to reusing the interleaved technology objects in a subsequent application of the method. As discussed above, column 9, lines 24-28 of Verissimo, relied on in support of the rejection, does not describe or suggest technology objects, much less, technology objects that can be reused in a subsequent application of the method. For this separate reason, claim 31 is submitted to be allowable.

**xv. Claim 32**

Claim 32 is directed to a system for programming an industrial controller. The system includes: an industrial control system; means for selecting a plurality of technology objects relevant to a desired application; means for interleaving the selected technology objects to form

technology objects having complex functionality, and means for distributing the interleaved technology objects onto a plurality of devices.

Based on the discussion and arguments set forth above, Verissimo does not disclose or suggest any of the above-referenced means relating to technology objects, for their selection, their interleaving to form technology objects having complex functionality or for distributing the interleaved technology objects onto a plurality of devices. Verissimo merely describes function blocks, and the linking of such blocks, which achieves neither the structure, the function, or advantages of the claimed system, as described at length above and throughout the application.

Claim 32 is submitted to be directed to allowable subject matter.

#### **IV. Rejection Under 35 U.S.C. § 103(a)**

Claim 20 stands rejected as unpatentable over Verissimo, in view of U.S. 5,485,620 to Sadre (hereinafter Sadre). Claim 24 is also rejected as unpatentable over Verissimo. Applicants respectfully submit that these rejections are traversed on the basis of the following arguments.

A rejection under 35 U.S.C. § 103(a) requires the establishment of a *prima facie* case that the claimed subject matter, including all claim elements, would have been obvious to a person having ordinary skill in the art on the basis of either a single prior art reference or more than one reference properly combined. As no such *prima facie* case has been established for these claims, Applicants respectfully traverse these rejections, as set forth more fully in the discussion that follows.

##### **i. Claim 20**

Claim 20 depends directly from claim 16 is submitted to be allowable on the same grounds. Furthermore, claim 20 is directed to technology objects that are distributable “among control units in equidistant communications with one another in real time with clock synchronization.” For the reasons set forth above, particularly those advanced for claim 16, Verissimo does not in any way disclose or suggest technology objects, and is admitted not to disclose that the functionality of the technology objects is distributed among control units in equidistant communications with one another in real time with clock synchronization -- a

shortcoming supposedly overcome by Sadre. But Sadre fails to supply the admitted deficiencies of Verissimo. Like Verissimo, Sadre neither describes nor suggests technology objects nor any other limitation recited in claim 20.

The passage of Sadre particularly relied upon in support of the rejection, column 12, lines 50-60, purports to describe synchronization of workstations in a sequential assembly system. Setting aside, for the moment, that Sadre does not refer to technology objects, even the workstations it does disclose are not described by Sadre as being “in equidistant communication with one another in real time.” Rather, they communicate only with a “control unit 2.”

Finally, Sadre is not properly combined with Verissimo and the combination of particular passages, even if proper, could not be performed without reference to the pending application.

Claim 20 is, therefore, submitted to be independently patentable over the art of record.

#### **ii. Claim 24**

Claim 24 depends directly from independent claim 16 and is submitted to be allowable for the same reasons. Furthermore, claim 24 is directed to feedback-free programming of a technology object with respect to the other technology objects and control means. As described at length above, and as conceded in the Office Action, Verissimo does not disclose or suggest technology objects, much less feedback-free programming of a technology objects with respect to the other technology objects and control means.

In what may be an oversight of a typographical nature, the concession that Verissimo does not disclose the recited invention is taken as a basis for concluding that the absent teaching is obvious over Verissimo.

Applicants respectfully submit that no prima facie case of obviousness has been made out and submit that the claim is allowable over the art of record.

**CONCLUSION**

Upon entry of this Amendment, claims 16-32 are pending in the application. Applicants submit that the claims, for the reasons set forth above, are in condition for allowance. Reconsideration and allowance are therefore respectfully requested. If a fee is required, the Assistant Commissioner is authorized to charge the fee to Deposit Account No. 23-1703.

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Respectfully submitted,

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